Target Generation Facility (TGF)
ACB-860 Simulation Group

Project Summary

Fiscal Year 2004

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November 30, 2004

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TGF Project Summary FY 2004

Executive Summary

The Target Generation Facility (TGF) completed another successful simulation year. All simulations were provided on-time and met or exceeded customer expectations. In addition to completing these simulations many enhancements were added to the Target Generation Facility's infrastructure including aircraft dynamics model (ADM) enhancements, simulation pilot workstation hardware and software improvements and the TGF network infrastructure.

This year the TGF office cubical's were refreshed.
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Section 1 – Simulation Projects Supported

This section summarizes the simulation efforts supported by the Target Generation Facility during the fiscal year.

1.1 Simulation: Required Navigational Performance (HFL)

Simulation Dates: October 2003 – December 2004,

Program Office: ATP 500

Contacts: Jeff Williams, ATP 500

<u>Simulation Summary</u>

The purpose of this simulation was to identify the possibility of utilizing the ASR9 display to identify blunder aircraft during a simultaneous instrument approach operation. The airspace adapted for the simulation was Northern California Tracon, Sector B (San Francisco Arrival).

The airspace simulated in this project was Northern California Tracon, Sector B (San Francisco Arrival).

1.2 Simulation: Tracon Controller Weather Information Needs - WIDS (HFL)

Simulation Dates: December 2003 – October, 2004

Program Office: AAR100

Contacts: Dino Piccione

Simulation Summary
This simulation was run to identify controller needs for displayed weather information. The airspace used in the project was the HFL's Genera Tracon. TGF adapted the sim-pilot workstation displays to display weather in conjunction with simulation events.

1.3 Simulation: TMA_2 (HFL)

Simulation Dates: August 2004 – November 2004

Program Office: Air Traffic Organization – En Route (ATO-E)

Contacts: Rob Williams AOZ 500

Simulation Summary
This simulation was run to evaluate location and format of TMA data on the ATC display. The airspace used in this project was the HFL's Genera Center, Sector 08.

1.4 Simulation: Domestic Reduced Vertical Separation Minima (DRVSM)

Simulation Dates: February 9, 2004 – March 25, 2004

Program Office: ATP-6 Domestic Reduced Vertical Separation Minima (DRVSM)

Contacts: Steve Creamer ATP-6 Domestic Reduced Separation Minima
                      Jerry Hadley ACB-330

Simulation Summary
This simulation of the Indianapolis Center is a continuation of the DRVSM 2 study. The study continues to focus on the FL290 – FL410 altitude band to compare the various approaches to implementation. A further goal for this study was to determine the effect of non-RVSM equipped aircraft. This en route simulation involved four sectors of Indianapolis Center: 87, 88, 97, and 98. The DRVSM procedure is scheduled for activation in late 2004 to early 2005 time frame and TGF provides an excellent environment in which the controller's workload can be evaluated.

1.5 Simulation: STARS - FMA

Simulation Dates: March 23-25th, 2004 (Interim)
                      March 29 – April, 1 (PHL)

Program Office: STARS ATO-T

Contacts: Leroy H. Harnett ATO-T (ATB232B)
                      FMA AT Test Lead

Simulation Summary

This simulation required the adaptation of the Denver TRACON and the re-use of the
PHL TRACON originally adapted for the Full Service 1 build of the STARS system.
The Interim simulation was run in the Denver TRACON and the native simulation was
run in the PHL TRACON.

The PHL scenarios made use of eight sectors:

Sector	Frequency	Sector	Frequency
SA	126.600	Y	123.800
FV	125.400	SD	119.750
NA	128.400	ND	124.350
W	127.350	PHL Tower	118.500

The scenarios ranged in size from 39 to 179 flight plans. Each one was designed to
exercise a specific aspect of the STARS FS1 system. These scenarios were all designed
to last approximately 1 hour. The simulations required 11 – 14 simpilots to fly the 8
sectors. Each simulation had the PHL ASR9 radar configured.

The Denver simulation made use of 10 sector with working names as follows:

Sector	Frequency	Sector	Frequency
Final Radar One	123.850	Local Control One	124.300
Final Radar Two	120.800	Local Control Two	133.300
Final Radar Three	125.750	Local Control Three	132.350
Arrival Radar One	120.350	Local Control Four	145.300
Arrival Radar Two	119.300		
Arrival Radar Three	124.950		

There were two scenarios. One North flow and one South flow. The South flow scenario
contained 123 flights and was designed to last 1 hour, the North flow scenario also was
designed to run 1 hour but had 63 flights total.

1.6 Simulation: STARS – Standard Terminal Automation Replacement System

Simulation Dates   August 12, 2004

Program Office: ATO-T STARS

Contacts: David Cognata   ATO-T Sr. Air Traffic Control Specialist
609-485-9198

      Gary Miller   ATO-T STARS
609-485-7175

      Ed Gaguski   ATO-T STARS

Simulation Summary

This simulation of PHL TRACON was performed to exercise the FS2 LCM Release 8.
It will re-use all of the previously built scenarios

1.7 Simulation: SATS (Small Airport Transportation System)

Simulation Dates: October, November, December, 2004

Program Office: NASA Langley Research Center SATS-HVO
                     (Higher Volume Operations)

Contacts: Brian Baxley   Level 3 Project Manager
                                          SATS HVO
                                          (757) 864-7317

Simulation Summary

This simulation is a joint project between NASA Langley Research Center and the FAA. The project's purpose is to evaluate controller workload and procedures for an SCA (Self-Controlled Area) around a non-towered airport, as part of the SATS HVO program. The TGF integrated NASA's AMM (Airport Management Module) software into the simulator providing the same sequencing messages to the simulated flights as they would in the field. Both types of air traffic environment (Center and TRACON) were studied, specifically, Washington Center ZDC – Danville Airport and PHL TRACON – Chester County Airport 40N. A third study utilizing NASA's desktop cockpit simulators was conducted re-using the ZDC – Danville airport scenarios. TGF integrated the NASA desktop simulators into the simulation by establishing data and voice over IP utilizing Cisco routing and Telex voice equipment.

1.8 Simulation: Free Flight Technology Integration Laboratory (FFTIL)

TGF system use 2004

The Free Flight Technology Integration Laboratory (FFTIL) conducts simulations to test various builds and adaptations associated with the Center-TRACON Automation System (CTAS). This testing required the use of TGF's RADAR & Interfacility emulators. This activity included but not restricted to the following:

- Non-interference testing with ARTS IIIE & A Systems
- Functionality testing of new CTAS builds & adaptations using both ARTS3E ARTS3A and STARS Terminal systems.
- Integration and functionality testing using the Host with STARS & the Host with ARTS.
- Field problem resolution in support of AOS.

All of these various activities were completed without delay due to the stability, dependability, and availability, of the TGF radar systems.

Section 2 – Technical Summary

This section summarizes the technical achievements of the TGF during the fiscal year.

2.1 JAVA-Based simulator in full service

Every project this fiscal year was conducted solely with the JAVA-Based simulator.

2.2 Addition of an RNAV approach model.

An extensive investigation of the aerodynamics of approach and take-off flight was undertaken culminating in a successful addition of RNAV approach and take-off dynamics to the ADM (Aircraft Dynamics Model).

2.3 Simpilot workstation JAVA – Based

The simpilot station software was re-written in JAVA from the previous C/Tcl-Tk application. This provides for code sharing between the pilot station and core dynamics as well as lowering the skills mix required to work on the simulator code.

2.4 Improved approach logic thru the appch command.

TGF improved the fidelity of the approach simulation by implementing the appch command. This command initiates logic in the Aircraft Dynamics Model that monitors the estimated distance to touchdown. When the distance is shortened (i.e. early turn to final) the model will begin to shed energy/altitude/speed thru the use of Flaps/Speed Breaks and Gear extension.

2.5 TGF Network Infrastructure refreshed

TGF procured and deployed a cisco 6500 router along with two cisco 4500 switches. This Technology refresh places TGF on par with the general Technical Center Backbone.

2.6 Pilot workstation Hardware refresh

TGF procured and deployed new mainboards for the pilot workstations moving them from 700 MHz to 2.8 GHz processors. Half the lab displays were refreshed to Viewsonic VX2000 LCD displays, the second half of the lab will be refreshed in FY05

TGF Acronyms and Abbreviations

ADAR	ARTS Data Acquisition & Router
AGW	ARTS Gateway
ARTS	Automated Radar Terminal System
ATCT	Air Traffic Control Tower
CAS	Controller Awareness Study
CTAS	Center TRACON Automation System
CHI	Computer Human Interface
CPDLS	Controller Pilot Data Link Communications
DFS	Deutsche Flugsicherung (German Simulation)
DIS	Distributed Interactive Simulation
DRVSM	Domestic Reduced Vertical Separation Minimum
DSR	Display System Replacement
EDC	Early Display Configuration
ETVS	Enhanced Terminal Voice Switch
FAST	Final Approach Spacing Tool
FFP	Free Flight Phase
FS1, 2/2+	Full Service 1, 2/2+
GAO	Government Accounting Office
GOERS	GPS Outage En route Simulation
GPS	Global Positioning System
HAD	High Altitude Demonstration
HAT	High Altitude Test
HFL	Human Factors Laboratory
HLA	High Level Architecture
IIF	Integration and Interoperability Facility
LAAEP	LA Arrival Enhancement Project
McTMA	Multi-Center Traffic Management Advisor
NAS	National Airspace System
NATCA	National Air Traffic Controllers Association

PARR	Problem Analysis Resolution and Ranking
PAS	Pseudo Aircraft System
PDU	Protocol Data Units
PTR	Program Trouble Reports
RDHFL	Research Development and Human Factors Laboratory
RNAV	Area Navigation
RVSM	Reduced Vertical Separation Minimum
STARS	Stand Alone Terminal ARTS Replacement System
TATCA	Terminal Air Traffic Control Automation
TFM	Traffic Flow Management
TGF	Target Generation Facility
TMA	Traffic Management Advisor
TRACON	Terminal Radar Approach CONtrol
URET	User Request Evaluation Tool
WJHTC	William J. Hughes Technical Center
XPVD	X-windows Planned View Display

TGF Airports and Centers

ADW	Andrews Air Force Base
DCA	Ronald Reagan International Airport
EWR	Newark International Airport
Genera	Generic airspace generated for HFL studies
JFK	John F. Kennedy International Airport
PHL	Philadelphia International Airport
ZDC	Washington Center
ZID	Indianapolis Center
ZJX	Jacksonville Center
ZNY	New York Center
ZOB	Cleveland Center